Towards a model of organisational prerequisites for enterprise-wide systems integration
Examining ERP and data warehousing

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Abstract

Purpose – The need for an integrated enterprise-wide approach to management information pronounced data warehousing (DW) the "hot topic" of the early-to-mid-1990s. However, it became unfashionable in the late 1990s, with the widespread implementation of enterprise resource planning (ERP) systems. With ERP managers were led to believe that they would derive informational as well as operational benefits from the introduction of integrated enterprise-wide systems. However, the recent re-emergence of DW, to address the limitations and unrealised benefits of ERP systems, provides a new, more complex integration challenge. The main objective of this paper is to present the concept of organisational prerequisites for enterprise-wide integration projects as a means to help managers preparing for and managing their ERP/DW projects.

Design/methodology/approach – This paper draws on existing literature on ERP and DW implementations. It puts forward a model to be further tested and validated by ERP researchers.

Findings – The proposed model has the potential to solve the problems experienced in ERP implementations and, more generally, in projects leading to large-scale enterprise integration.

Originality/value – Existing ERP research indicates that the intelligence phase of most ERP projects is ignored both in practice and in research. This paper lays the foundation for a framework that addresses this problem.

Keywords Project management, Information systems, Integration, Database management systems, Manufacturing resource planning

Paper type Research paper

Introduction

For more than a decade, organisations have adopted a number of different approaches to information systems (IS) integration; from data warehousing (DW) in the early to mid-1990s, striving to achieve informational integration, through to enterprise resource planning (ERP) in the mid-to-late 1990s, focusing on operational integration. In particular the evolution of the ERP movement has gone through a number of waves in an effort to achieve ever-increasing levels of enterprise integration. According to Kalakota and Robinson (2001), Wave 1 addresses the emergence of manufacturing resource planning (MRP), Wave 2 relates to ERP, Wave 3 positions customer-centric integration (CRP), and Wave 4 identifies inter-enterprise integration (XRP) (Jeanne, 1999). However, we identify a new wave, Wave 5 which positions extended ERP (ERP II) as the "new", or is it in fact "nothing-new", integration, as illustrated in Figure 1. For the purpose of this paper we argue that the term ERP II is not about newer, better, flashier technology, but about extracting real, tangible business benefits from ERP software (Fornadel, 2003). Since the mid-to-late 1990s, organisations expected
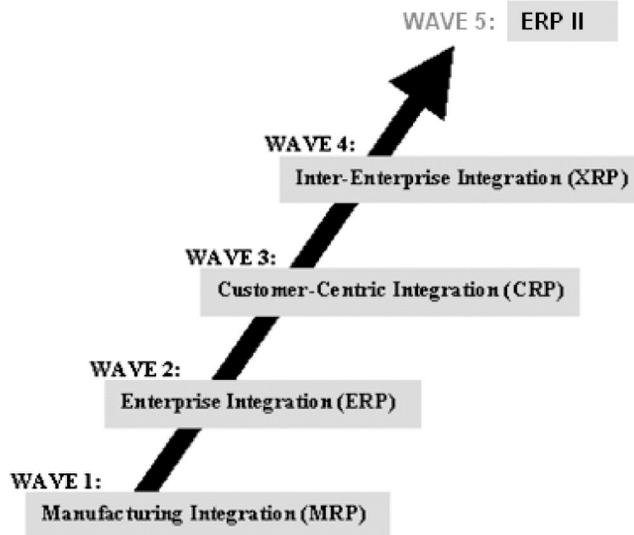
Figure 1.
The five waves of the
ERP movement

enterprise technologies to provide the ultimate in supply chain capabilities, with buzzwords like "integration", "collaboration" and "optimisation" proposed to ensure definite success (Fornadel, 2003). As a result, organisations around the world invested billions in ERP, supply chain management (SCM), and customer relationship management (CRM), unfortunately, this confidence in technology was misplaced, where only a very small number of implementations were successful (Fornadel, 2003). Therefore, we can now observe a "bizarre trend" (Hayler, 2003, p. 1) emerging: the re-implementation and ERP II (Humphries and Jimenez, 2003; Hayler, 2003). According to the *New Straits Times* (2003) the achievement of potential value is through the use of "fine-tuned" ERP II type functionality.

It is established that one of the most significant factors for Wave 2 ERP adoption was Y2K preparation (Brown *et al.*, 2000; Kalakota and Robinson, 2001; Themistocleous *et al.*, 2001; Hayler, 2003), however by contrast, we contend that the most important factors for the emergence and adoption of Wave 5 have been questionable benefits realisation in previous ERP implementations and unmet informational requirements. In general, the success rate of ERP implementations has been low with organisations finding themselves at the beginning of a rather steep learning curve with much disturbance in their everyday business. We argue that the scale of these problems is related to the difficulty inherent in integration at the level of an entire organisation. Therefore, as organisations move from one wave to the next they face increasingly accute problems instead of solving their difficulties.

Many research studies of ERP implementations have reported how the failure to properly analyse requirements and understand the impact of the changes brought about by ERP implementations has created problems for implementing organisations and has curtailed the extent to which they have been able to derive benefits from their investments. As organisations moved toward the post-implementation phase of their ERP projects, post Y2K for the vast majority of organisations, the real issue of benefit realisation emerged (Sammon *et al.*, 2003). Pallatto (2002) comments on the fact that

some vendors and consultants are presently "soft-peddling" the term ERP due to bad experiences and management frustration, when original business goals and benefits were not achieved, with their ERP implementations. Pallatto (2002) adds that concessions and compromises in the design of these rushed Y2K upgrade projects (ERP) had negative impacts on systems performance and benefits which were not promptly and fully communicated to the implementing organisation. Hendrickson (2002) supports this argument, stating that "organisations that have future designs developed from a clear understanding of [business] requirements will gain more vision and value from their ERP implementation".

One benefit in particular which has not materialised has been the provision of an integrated informational platform to facilitate reporting on every aspect of an organisations activities. This is leading organisations to reconsider undertaking DW projects or to pursue their ERP travels further down the Wave 5 route. Owing to the monolithic style integration of the mid-to-late 1990s, many organisations are now discovering that the solution to leveraging investment decisions in, and retrieving useful data from, an ERP system is to undertake additional initiatives, for example DW, in conjunction with the implemented ERP system (Sims, 2001; Raden, 1999; Inmon, 2000; Radding, 2000; Hewlett-Packard, 2002; Hayler, 2003; Sammon et al., 2003). Sammon et al. (2003) refer to this as a "double learning curve" for an organisation, undertaking additional projects in quick succession to the ERP project, in an attempt to finally achieve the benefits expected but never realised. The harsh reality of ERP systems implementation, to the expense of those organisations that invested resources in the initiative, is that ERP only gets data into the system, it does not prepare data for use and analysis (Inmon, 2000). This is due to the fact that ERP systems lack certain functionality and reporting capabilities (Adam and Doyle, 2001). However, it bears thinking that as long as organisations can analyse data, supporting different business processes, even across differing data structures that change with the diversity of systems, there is no need to force a rigid standardisation of business processes (a straightjacket) across the organisation (Hayler, 2003). Many organisations experience frustration when they attempt to use their ERP system to access information and knowledge (Radding, 2000). It has been quickly realised that ERP systems are good for storing, accessing and executing data used in daily transactions, but are not good at providing the information needed for long-term planning and decision making (Radding, 2000; Adam and Doyle, 2001) as ERP systems are not designed to know how the data are to be used once they are gathered (Inmon, 1999).

"Ignore history – condemned to repeat it" (Judge, 1997; Webster, 2000) seems to be an adequate statement when it comes to describing the mixed fortunes of organisations deploying information systems (IS) and researchers approaches to studying these IS evolutions. This may be due to the fragmentation of research in IS as described by Banville and Landry (1989) and Adam and Fitzgerald (2000). Indeed, Lucas (1991) suggested that, as a field, we need to think about interesting problems and look for underlying issues rather than focus on today's "hot topic" to keep up with the latest IS fashion. Therefore, addressing the suggestions of Kraemer and Dutton (1991) and Land (1995), the objective of this paper is to build on existing research carried out in the areas of DW and ERP, therefore, emphasising a "continuity of ideas" and constructing a "cumulative" body of research. In particular, we focus on the concept of organisational prerequisites as a vehicle for supporting the self-analysis of

organisations towards a better understanding of the impact and intricacies of enterprise-wide systems integration projects.

Understanding organisational prerequisites

Organisational prerequisites are generated through an examination of critical factors throughout the lifecycle of an IS project (planning, implementation, post-implementation). However, in use, organisational prerequisites are concerned with the "pre-planning" or "intelligence" phase of a project implementation life-cycle. Finnegan and Sammon (1999), Sammon and Finnegan (2000) proposed the concept of organisational prerequisites in their study of DW project implementations. Finnegan and Sammon (1999) proposed that every organisation that initiates a DW project encounters its own unique "set of issues" around a common set of factors. Therefore, they defined organisational prerequisites as:

> [...] necessary elements existing within the organization, which are examinable [*internally*] by the implementing organisation, prior to the organisation undertaking the initiation of a data warehousing project (Finnegan and Sammon, 1999, p. 183).

As illustrated in Table I Finnegan and Sammon (1999), Sammon and Finnegan (2000) highlight a number of factors that legitimise the need for a model of organisational prerequisites in relation to DW project implementations.

Therefore, an organisation should be empowered to assess its readiness/preparedness for the successful implementation of a DW system prior to project initiation, in a vendor/consultant independent, methodology independent, and pre-implementation thought process. As a result, Sammon and Finnegan (2000, p. 83) stated:

> [...] there is a need to identify a method of assessment that is structured in an easily understood and interpretable format, and is directed at use internally by the implementing organization.

Evidently, this precondition is not met in the context of the ERP market where implementing organisations are tied into tightly binding solutions both in terms of vendors and consultants. The concept of prerequisites, therefore, seems quite timely to assist managers address the "issues of concern" inherent in enterprise-wide systems integration projects.

The structure of the organisational prerequisite model for DW

The critical areas of the Finnegan and Sammon (1999), Sammon and Finnegan (2000) research model are structured into a five-factor table, as illustrated in Figure 2 under the following headings (Systems factors, Data factors, Skills factors, Organisational factors, Project management factors). The factors are not mutually exclusive in relation to their influence on a DW project implementation. The "multiplicative effects" of these factors combine to drastically affect the implementation of the DW system, beyond the intentioned plan at the initial phase. Each of these factors contains certain issues, which have been documented and refined from existing readiness models; other advocates proposed research models; previous causes of documented failures; along with factors critical to the successful implementation of DW projects.

Factor	Description
[1] Every organisation that initiates a data warehousing project encounters its own unique "set of issues" around a common set of factors	Given that there are numerous similarities in all data warehousing projects and given that 50 per cent of all data warehousing projects undertaken have experienced some degree of failure and for remarkably similar reasons, if this common set of factors can be identified and their occurrence sign-posted in a structured format, then organisations could determine their suitability for data warehousing project initiation
[2] High number of data warehousing project failures	Even though all of the causation factors associated with data warehousing project implementation failure are not concerned with the initial stages of the project directly, they can lead to failure at some stage of the implementation, and should be taken into account at the start of the project
[3] The level of clarity and understanding of the data warehousing project initiative that exists within the organisation needs to be determined	If the causes of likely future problems can be identified in advance, then they can be addressed, or at least sign-posted and worked around, thus improving the data warehousing projects chances of success, prior to implementation initiation
[4] The use of a corporate readiness model in a data warehousing project implementation is incorporated into the "preparatory stage" of an implementation methodology	The organisation cannot assess its readiness, prior to the initiation of the project, due to the fact that the project has been initiated once the readiness tests are introduced. Furthermore, these models are complex and not suited to use internally within the organisation
[5] The format of the model does not lend itself to internal use, within the implementing organisation	The existing readiness models are specifically related to external consultancy use in data warehousing implementations and require the external consultants to interpret the meaning of each readiness check and identify the areas of focus for the organisation. The structural meaning and interpretation of the models is complex, and involve a lot of computation in use. The lack of academic research in the area of enterprise readiness for the successful implementation of a data warehousing project is evident in the lack of methodological "scholarly rigour" being applied to the existing models

Table I.
The need for organisational prerequisites in DW project implementations

Each of these factors is examined within the organisation through the examination of the logical process of going through three conceptual stages (Existing, Planned, Implemented), as illustrated in Figure 2. The "Existing" stage documents what the organisation had in place prior to the initiation of the DW project. The "Planned" stage documents what the organisation felt they needed (and planned for) to achieve the successful implementation of the DW system. Finally, the "Implemented" stage identifies what the organisation ended up with, in the successfully implemented warehousing system. This progression highlights the organisation's diversity of experiences in DW project implementation, and the "lessons learned" through the initial and subsequent warehousing initiatives within the organisation.

The research objective of the Finnegan and Sammon (1999), Sammon and Finnegan (2000) study was forward looking and addressed issues in relation to DW project implementation that are of significant practical value to organisations, who for the first
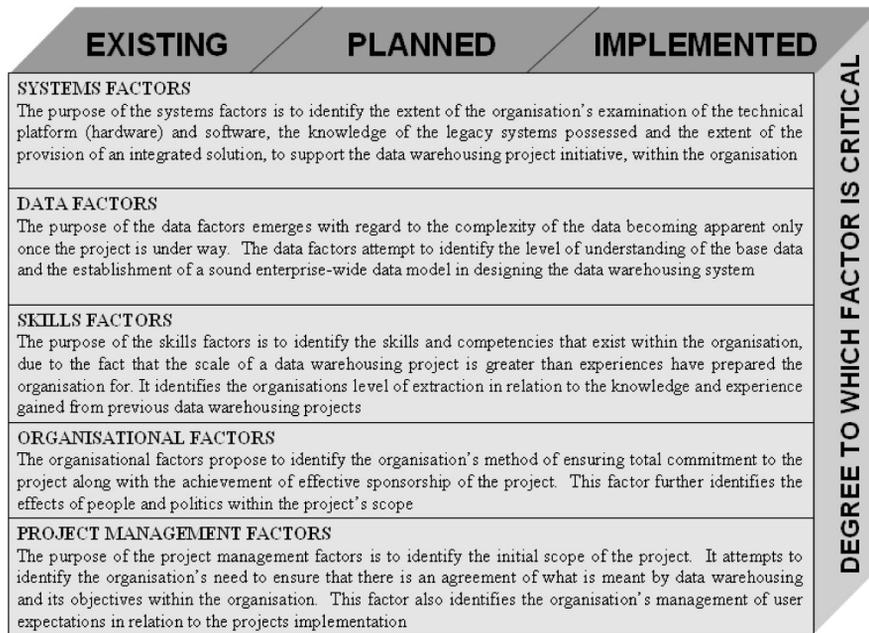
EXISTING	PLANNED	IMPLEMENTED

SYSTEMS FACTORS
The purpose of the systems factors is to identify the extent of the organisation's examination of the technical platform (hardware) and software, the knowledge of the legacy systems possessed and the extent of the provision of an integrated solution, to support the data warehousing project initiative, within the organisation

DATA FACTORS
The purpose of the data factors emerges with regard to the complexity of the data becoming apparent only once the project is under way. The data factors attempt to identify the level of understanding of the base data and the establishment of a sound enterprise-wide data model in designing the data warehousing system

SKILLS FACTORS
The purpose of the skills factors is to identify the skills and competencies that exist within the organisation, due to the fact that the scale of a data warehousing project is greater than experiences have prepared the organisation for. It identifies the organisations level of extraction in relation to the knowledge and experience gained from previous data warehousing projects

ORGANISATIONAL FACTORS
The organisational factors propose to identify the organisation's method of ensuring total commitment to the project along with the achievement of effective sponsorship of the project. This factor further identifies the effects of people and politics within the project's scope

PROJECT MANAGEMENT FACTORS
The purpose of the project management factors is to identify the initial scope of the project. It attempts to identify the organisation's need to ensure that there is an agreement of what is meant by data warehousing and its objectives within the organisation. This factor also identifies the organisation's management of user expectations in relation to the projects implementation

DEGREE TO WHICH FACTOR IS CRITICAL

Figure 2.
Research model structure

time attempt to evaluate internally the plausibility of implementing a DW project. These organisations are at the initial decision-making stage of the "what", "why" and "how" of DW. According to Finnegan and Sammon (1999), Sammon and Finnegan (2000), their knowledge and understanding of DW and the organisation's suitability for project implementation at this point is at an unacceptable level. Therefore, the organisational prerequisites model can be viewed as a method of identifying the extent of the existence of necessary elements within the organisation for a DW project implementation. The same approach can also be extended for enterprise-wide systems integration project implementations (ERP and DW).

Applying the concept of prerequisites to ERP implementations

Lucas (1981) defined implementation as the whole process of introducing a system into an organisation, from conception of an idea, to analysis, design, installation and operation. The inclusion of "conception of an idea" is something which seems to be overlooked throughout current research in ERP implementation, highlighting the issue that the decision-making process prior to ERP software selection is not considered within the scope of the implementation process models (Shanks *et al.*, 2000). The analysis step of most ERP projects seems to skip the early stages and to focus on a package evaluation exercise (Kelly *et al.*, 1999). The phase of problem finding (Pounds, 1969), where organisational actors identify stimuli in the environment which they come to perceive as problems requiring their attention, has not been a feature of any reported ERP projects, due in reality, to the very strong sales discourse existing in the ERP market. Sammon and Adam (2004) concluded that few research projects have examined the first phase (intelligence phase), however, this stage of the decision making process is crucial in ERP projects as noted by Pomerol (1994), because ideas

and alternatives not considered at this stage are very unlikely to be considered in the later stages. Thus, decision-making processes in relation to ERP selection are inherently weak in many organisations. This is highlighted in Figure 3, using Simon's (1977) four-stage decision-making process (normative) model as a guide to locate the focus of existing research in ERP.

Several researchers have developed process models for ERP implementation (Bancroft *et al.*, 1998; Ross, 1999; Markus and Tanis, 2000; Shanks *et al.*, 2000, Parr and Shanks, 2000; Shakir, 2000) and from a synthesis of these models, planning is identified as the first phase, as illustrated in Figure 3, and the key activities undertaken can be identified as; assembly of a steering committee; development of a business case for ERP; ERP package selection; selection of a consultant; selection of a project team manager; creation of a project plan. However, adopting these implementation processes has returned a high rate of failure, both in terms of project implementation and the delivery of expected benefits. In addition, according to Somers and Nelson (2001, p. 1):

> [...] broad-based empirical research in the CSFs that impact implementation is still very limited.

Furthermore, Nah *et al.* (2001) report that the difficulties of ERP implementations have been widely cited in the literature but research on critical factors for initial and ongoing ERP implementation success is rare and fragmented. We contend that the shortfall of the available literature is highlighted by the fact that it simply classifies the CSFs into the phases of the ERP implementation process models and, in effect, does not extend to the inclusion of factors of critical importance, prior to the ERP planning phase, referred to as the "Intelligence" phase in Figure 3. To illustrate this point further we have identified a number of "issues of concern" around the current implementation of ERP, as illustrated in Table II.

The "issues of concern" identified in Table II for ERP project implementation, mirror those identified for DW project implementation in Figure 2, to legitimise the need for a model of organisational prerequisites. Therefore, this demonstrates our "continuity of ideas" in this research study. Also, due to the fact that organisational prerequisites are concerned with the "pre-planning" or "intelligence" phase of a project

Figure 3.
A classification of organisational research in ERP

Issues of concern	Description	Reference
[1] The planning phase of an ERP implementation project	The scale of ERP projects has rarely been tackled by most organisations highlighted by an inadequate organisational analysis at the beginning of the project	Kelly et al. (1999)
[2] The complexities of the ERP market	This issue is illustrated through the concept of the ERP community and the role of each actor (ERP vendor, ERP consultant, and implementing organisation) in the ERP project implementation	Sammon and Adam (2002); Esteves and Pastor (2001); Wood and Caldas (2001); Hossain and Shakir (2001)
[3] Complex implementation	Many ERP systems implementations fail, to a degree or completely, to meet project constraints due to their complexity	Sammon and Adam (2004)
	An ERP package is so complex and vast that it takes several years (lengthy) and millions of dollars (expensive) to roll out	Davenport (1998); Martin (1998); Bingi et al. (1999); Holland et al. (1999); Shanks et al. (2000); Koch et al. (1999); Saint-Leger and Savall (2001)
[4] High rates of failure in ERP project implementation	The combined effect of [1], [2] and [3] The high failure rate of ERP implementation calls for a better understanding of its CSFs	Somers et al. (2000)
[5] Failure to deliver expected benefits	As a result of [4]	Bingi et al. (1999); Stefanou (2000); Saint-Leger and Savall (2001)
	On average, ERP projects deliver only 30 per cent of the promised benefits	Krumbholz et al. (2000)
	Only around 10 per cent to 15 per cent of ERP implementations deliver anticipated benefits	Rutherford (2001)
[6] Level of dependence	Once an ERP system is implemented, going back is extremely difficult; it is too expensive to undo the changes ERP brings into an organisation	Bingi et al. (1999)
	Owing to the all-encompassing nature of all ERP offerings, a level of dependence is created that far surpasses the dependence associated with prior technological regimes	Markus and Tanis (2000)

Table II.
Issues of concern in ERP
implementation

implementation life-cycle, their need has been further legitimised by a number of researchers. Parr and Shanks (2000) call for an examination of the criticality of critical success factors (CSFs) associated with a successful ERP project implementation and organisational prerequisites, by design, focus on an analysis of the "degree of criticality" of a factor to a project implementation. Markus *et al.* (2000, p. 245) propose that while organisations experience problems at all phases of the ERP system life-cycle, many of these problems experienced in later phases originated earlier but remain unnoticed or uncorrected, therefore, researchers and organisations:

> [...] will do well to adopt broad definitions and multiple measures of success and pay particular attention to the early identification and correction of problems.

As represented in Figure 3, there is a need for research into the "Intelligence" phase of the decision making process for ERP software selection, highlighting the critical factors for both selection and implementation of an ERP package in a "pre-planning phase" environment, therefore, facilitating a vendor/consultant independent, methodology independent, and pre-implementation thought process. In support of this argument, Stafyla and Stefanou (2000, p. 293) state that:

> [...] given the cost and the permanent nature of ERP investments, an understanding of the way decisions are taken concerning the adoption, evaluation and selection of ERP software can be very useful for both academic research and practice.

However, Esteves and Pastor (2001) go one step further by highlighting the important issue concerning the definition of "those decisions" organisations face prior to implementing an ERP system. Caldas and Wood (1998) and Wood and Caldas (2001, p. 5) called for:

> [...] the utilisation of a broader [alternative] perspective to its [ERP implementation] comprehension, one that would challenge the reductionism and information technology biases that have characterised the prevailing approach to the subject.

Therefore, we propose that a key milestone in, and radical approach to, enterprise-wide systems integration research will involve the identification and development of an organisational prerequisites model for ERP projects. Using the evolutionary waves in Figure 1 we contend that this organisational prerequisites model will be of use to any organisation undertaking a project corresponding to wave 2 and subsequent waves. In other words, a prerequisites model will not only be useful in the context of first-time implementations of ERP but will also enable organisations to correct the errors made in earlier ERP implementations, leverage their investments to a greater extent, and achieve full scale integration, for instance merge their ERP and DW initiatives.

Conclusions: towards an organisational prerequisites model for enterprise-wide systems integration projects

To conclude, we would argue that unsatisfactory success rates of ERP implementations to date is not an indication of the failure of ERP as a concept, it is the result of inadequate analysis of business requirements in preparation for ERP projects. This has resulted in organisations failing to achieve expected benefits from their implementations. Our contribution, as academics, must be to assist organisations to understand how they can leverage there IS/IT investments and to pursue their strategies in the case where mistakes have been made and can be corrected. We see the

concept of organisational prerequisites as the perfect vehicle to achieve both of these targets. Furthermore, although organisational prerequisites have been previously generated for DW (Finnegan and Sammon, 1999; Sammon and Finnegan, 2000), the authors believe that the model for enterprise-wide integration projects could potentially be used by researchers to propose a refined framework to facilitate ERP and DW projects. This will promote the identification of the areas that require attention prior to commencing implementation, and better understanding of the true impact of these initiatives on organisations. This seems to us to be the key to leveraging benefits on a scale commensurate with vendors' and consultants' claims.

There is no doubt in the authors' minds that initially, when organisations commenced the implementation of ERP systems they did not expect to have to invest in future DW solutions, or do it all again with a "later-wave" package to leverage their ERP investments. As a result of this, the early lessons learned by organisations, in relation to DW, should not be dismissed. This new era of enterprise-wide systems integration projects introduces an increased level of complexity to an already complicated organisational initiative. In the past, in relation to ERP systems, organisations have been too accepting of the promises of the sales discourse. Therefore, an implementing organisation needs to be empowered and made aware of the increasing complexities of the ERP market and strengthen their needs discourse in relation to enterprise-wide integration project requirements.

References

Adam, F. and Doyle, E. (2001), "Enterprise resource planning at Topps Ireland Ltd", in Johnson, G. and Scholes, K. (Eds), *Exploring Corporate Strategy*, 6th ed., Prentice-Hall, Englewood Cliffs, NJ.

Adam, F. and Fitzgerald, B. (2000), "The status of the IS field: historical perspective and practical orientation", *Information Research*, Vol. 5 No. 4, July.

Bancroft, N., Seip, H. and Sprengel, A. (1998), *Implementing SAP R/3*, 2nd ed., Manning Publications, Greenwich.

Banville, C. and Landry, M. (1989), "Can the field of MIS be disciplined?", *Communication of the ACM*, Vol. 32 No. 1, pp. 48-60.

Bingi, P., Sharma, M. and Godla, J. (1999), "Critical issues affecting an ERP implementation", *Information Systems Management*, Vol. 16 No. 3, Summer, pp. 7-8.

Brown, C.V., Vessey, I. and Powell, A. (2000), "The ERP purchase decision: influential business and IT factors", *Proceedings of the 6th Americas Conference on Information Systems, Long Beach, CA, 10-13 August*, pp. 1029-32.

Caldas, M. and Wood, T. (1998), "How consultants can help organizations survive the ERP frenzy", available at: www.gv.br/prof_alunos/thomaz/ingles/paper6.htm (accessed 28 March 2000).

Davenport, T. (1998), "Putting the enterprise into the enterprise system", *Harvard Business Review*, July/August, pp. 121-31.

Esteves, J. and Pastor, J. (2001), "Enterprise resource planning research: an annotated bibliography", *Communications of the Association for Information Systems*, Vol. 7 No. 8, August.

Finnegan, P. and Sammon, D. (1999), "Foundations of an organisational prerequisites model for data warehousing", *Proceedings of the 7th European Conference on Information Systems (ECIS), Copenhagen, June*.

Fornadel, J. (2003), "Getting it right with ERP II", 7 August, available at: www.intelligenterp. com/feature/2003/08/0308feat1_1.shtml (accessed 19 November 2003).

Hayler, A. (2003), "ERP II – *déjà vu*?", *IT Toolbox – ERP Knowledge Base*, available at: http://erp. ittoolbox.com/documents/document.asp?i=2515 (accessed 28 October 2003).

Hendrickson, D. (2002), "Getting more out of ERP", *IT Toolbox – ERP Knowledge Base*, available at: www.erpassist.com/documents/document.asp?i=1268 (accessed 15 October 2002).

Hewlett-Packard (2002), "Strategic systems of the future: integrating ERP applications and data warehouses", *DM Review*, March.

Holland, C.P., Light, B. and Gibson, N. (1999), "A critical success factors model for enterprise resource-planning implementation", *Proceedings of the 7th European Conference on Information Systems, Copenhagen Business School, Copenhagen*, pp. 273-87.

Hossain, L. and Shakir, M. (2001), "Stakeholder involvement framework for understanding the decision-making process of ERP selection in New Zealand", *Journal of Decision Systems*, Vol. 10 No. 1, pp. 11-27.

Humphries, T. and Jimenez, M. (2003), "ERP scenario", *Proceedings of Software Infrastructure Track at Gartner Symposium ITXPO, Florence, 10-12 March*.

Inmon, W.H. (1999), "Data warehousing and ERP", available at: www.billinmon.com/library (accessed 24 November 2001).

Inmon, W.H. (2000), "ERP and data warehouse: reading the tea leaves", available at: www. billinmon.com/library/articles/arterpfu.asp (accessed 18 October 2001).

Jeanne, F. (1999), "Après l'ERP, voici le XRP pour l'entreprise étendue", *Le Monde Informatique*, 2 April.

Judge, A. (1997), "The art of non-decision making and the manipulation of categories", available at: www.uia.org/uiadocs/nondec.htm (accessed 24 October 2001).

Kalakota, R. and Robinson, M. (2001), *E-business 2.0: Road-map to Success*, Addison-Wesley, Reading, MA.

Kelly, S., Holland, P. and Light, B. (1999), "A departure from traditional systems development methodologies: enterprise resource planning, ERP, systems and the use of process-modelling tools", *Proceedings of the 9th Annual Business Information Technology Conference, Manchester, 3-4 November*.

Koch, C., Slater, D. and Boatz, E. (1999), "The ABCs of ERP", available at: www.c10.com/fornms/ erp/edit/122299_erp_content.html

Kraemer, K. and Dutton, W. (1991), "Survey research in the study of management information systems", in Kraemer, K., Cash, J. Jr and Nunamaker, J.F. Jr (Eds), *The Information Systems Research Challenge: Survey Research Methods*, No. 3, Harvard Business Press, Boston, MA, pp. 3-58.

Krumbholz, M., Galliers, J., Coulianos, N. and Maiden, N.A.M. (2000), "Implementing enterprise resource-planning packages in different corporate and national cultures", *Journal of Information Technology*, Vol. 15, pp. 267-79.

Land, F. (1995), "The new alchemist: or how to transmute base organisations into corporations of gleaming gold", *Proceedings of the 3rd European Conference of Information Systems, Athens, July*, pp. 21-30.

Lucas, H. Jr (1981), *Implementation: The Key to Successful Information Systems*, Columbia University Press, New York, NY.

Lucas, H. Jr (1991), "Commentary", in Kraemer, K., Cash, J. Jr and Nunamaker, J.F. Jr (Eds), *Information Systems Research Challenge: Survey Research Methods*, No. 3, Harvard Business Press, Boston, MA, pp. 67-79.

Markus, M.L. and Tanis, C. (2000), *The Enterprise Systems Experience – From Adoption to Success*, Claremont Graduate University, Claremont, CA.

Markus, M.L., Axline, S., Petrie, D. and Tanis, C. (2000), "Learning from adopters' experiences with ERP: problems encountered and success achieved", *Journal of Information Technology*, Vol. 15, pp. 245-65.

Martin, M. (1998), "Smart managing", *Fortune*, February.

Nah, F.F.H., Lau, J.L.S. and Kuang, J. (2001), "Critical factors for successful implementation of enterprise systems", *Business Process Management Journal*, Vol. 7 No. 3, pp. 285-96.

New Straits Times (2003), "Relying on technology to improve bottomline", available at: http://erp.ittoolbox.com/common/print.asp?i=103893 (accessed 5 November 2003).

Pallatto, J. (2002), "Get the most out of ERP", *IT Toolbox – ERP Knowledge Base*, available at: www.erpassist.com/documents/document.asp?i=1334 (accessed 15 October 2002).

Parr, A. and Shanks, G. (2000), "A model of ERP project implementation", *Journal of Information Technology*, Vol. 15, pp. 289-303.

Pomerol, J.C. (1994), "Le monde de l'aide à la décision", *Working Papers Series*, No. 94/20, pp. 1-26.

Pounds, W. (1969), "The process of problem finding", *Industrial Management Review*, Vol. 10 No. 1, pp. 1-19.

Radding, A. (2000), "Knowledge management appears on ERP radar", *Datamation*, available at: http://itmanagement.earthweb.com (accessed 18 October 2001).

Raden, N. (1999), "ERP and data warehousing", available at: www.archer-decision.com/artic11.htm (accessed 18 October 2001).

Ross, J.W. (1999), *The ERP Revolution: Surviving versus Thriving*, Centre for IS Research, Sloan School of Management, MIT, Cambridge, MA.

Rutherford, E. (2001), "ERP's ends justify its means", *CIO Online Quick Poll Report*, available at: www.cio.com/poll/042401_erp.html (accessed 18 July 2001).

Saint-Leger, G. and Savall, H. (2001), "L'après projet ERP: retour d'experience sur un changement qui n'a pas eu lieu" ("Post-ERP phase: feedback from experience regarding a change which did not occur"), *Proceedings of the Conference de l'Association Information et Management, Nantes*.

Sammon, D. and Adam, F. (2002), "Decision making in the ERP community", *Proceedings of the 10th European Conference on Information Systems, Gdansk, June*.

Sammon, D. and Adam, F. (2004), "ERP software selection – widening the debate", in Adam, F. and Sammon, D. (Eds), *The Enterprise Resource-Planning Decade: Lessons Learned and Issues for the Future*, Idea Publishing Group, Hershey, PA.

Sammon, D. and Finnegan, P. (2000), "The ten commandments of data warehousing", *Database*, Vol. 31 No. 4, pp. 82-91.

Sammon, D., Adam, F. and Carton, F. (2003), "The realities of benefit realisation in the monolithic enterprise systems era – considerations for the future", *Proceedings of the 10th European Conference on Information Technology Evaluation, Madrid, 25-26 September*.

Shakir, M. (2000), "Decision making in the evaluation, selection and implementation of ERP systems", *Proceedings of the 6th Americas Conference on Information Systems, Long Beach, CA, 10-13 August*, pp. 1033-8.

Shanks, G., Parre, E., Hu, B., Corbitt, B., Thanasankit, T. and Seddon, P. (2000), "Differences in critical success factors in ERP systems implementations in Australia and China: a cultural analysis", *Proceedings of the 8th European Conference on Information Systems, Vienna*.

Simon, H. (1977), *The New Science of Management Decisions*, Prentice-Hall, Englewood Cliffs, NJ.

Sims, D. (2001), "ERP integration strategies", *EA Community*, available at: www.eacommunities. com/articles/art23.asp (accessed 15 October 2001).

Somers, T. and Nelson, K. (2001), "The impact of critical success factors across the stages of enterprise resource-planning implementations", *Proceedings of the 34th Hawaii International Conference on Systems Sciences, Maui, HI*, pp. 1-10.

Somers, T.M., Nelson, K. and Ragowsky, A. (2000), "Enterprise resource planning (ERP) for the next millennium: development of an integrative framework and implications for research", *Proceedings of the 6th Americas Conference on Information Systems (AMCIS), Long Beach, CA, 10-13 August*, pp. 998-1004.

Stafyla, A. and Stefanou, C. (2000), "ERP software selection: a study using cognitive maps", *Proceedings of the 7th European Conference on Information Technology Evaluation (ECITE), Dublin, September*.

Stefanou, C. (2000), "The selection process of enterprise resource planning, ERP systems", *Proceedings of the 6th Americas Conference on Information Systems, Long Beach, CA, 10-13 August*, pp. 988-91.

Themistocleous, M., Irani, Z. and O'Keefe, R.M. (2001), "ERP and application integration: exploratory survey", *Business Process Management Journal*, Vol. 7 No. 3, pp. 195-204.

Webster, F. (2000), "Information, capitalism and uncertainty", *Information, Communication and Society*, Vol. 3 No. 1, pp. 69-90.

Wood, T. and Caldas, M. (2001), "Reductionism and complex thinking during ERP implementations", *Business Process Management Journal*, Vol. 7 No. 5, pp. 387-93.